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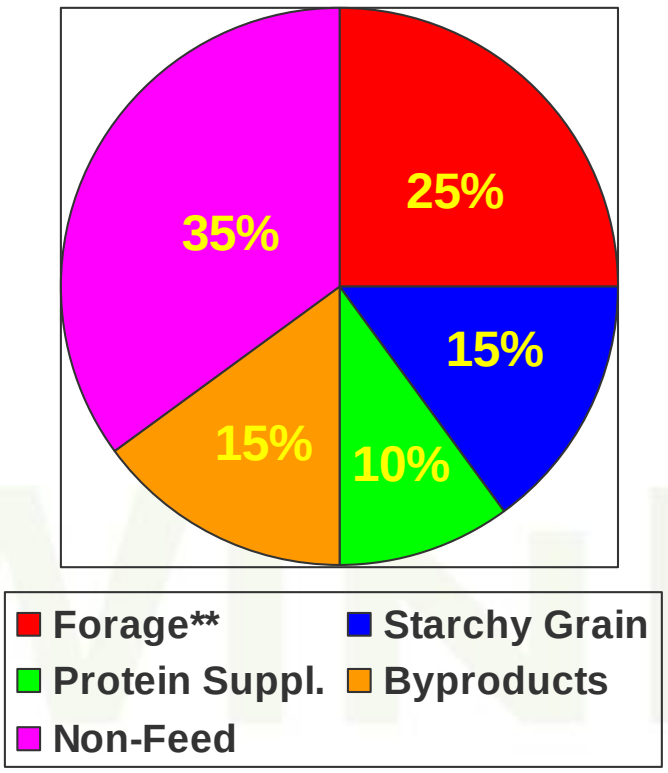
Brown & Kewaunee Counties
Dairy Forage Seminar
March 17, 2011
Green Bay, WI

Variation in Forages, Starch, Protein and Byproducts will compromise FCM

Sources of variation in FCM production



Data derived from DCM database

** Corn silage, alfalfa hay, etc.

Forage, Starch, Protein and Byproduct variation accounts for 65% of on-farm variation in fat corrected milk.

These sources of variation must be understood, measured and controlled to ensure predictable performance

HIGHER FORAGE DIETS

Healthier for cows

- More fiber of adequate particle size promotes cud chewing and elevates ruminal pH, improves total digestibility, and increases milk fat content (Yang and Beauchemin, JDS, 2007)
- More economical
- Less expensive grain
- More home grown feeds used in the ration

Today's Topics

- Forage Genetics International (FGI)
- Alfalfa Product Development
- Low Lignin Alfalfa
- Roundup Ready Alfalfa
- Alfalfa Management

Forage Genetics Footprint

With more than 40 research, testing and production facilities located across the United States, we have the experience, expertise and diversity to bring great ideas to life.

FGI is a wholly owned subsidiary of Land O' Lakes Inc.; a farmer owned cooperative.

Forage Genetics International

AgriSOLUTIONS CROPLAN GENETICS

ANSWER PLOT

Forage Genetics International (FGI)

West Salem, WI
Nampa, ID
Boone/Napier, IA
Touchet, WA
Woodland, CA
Lancaster, PA
Larned, KS

Forage Genetics International

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ANSWER PLOT

Plant Breeding/Product Development

FGI is world leader in value added alfalfa genetics

- Multiple alfalfa breeding programs, from varied geographies, tested and integrated over many years
- Elite genetics available ranging from Fall Dormancy 2-11. (FD 2 = dormant FD 11 = non-dormant)
- Product selection and testing conducted across in locations across the US (and abroad)
  - Allows us to develop seed varieties that deliver optimum yield and quality in local growing conditions.
  - While enabling us to develop products that perform and adapt across environments
- 35+ Product breeding stations and testing locations across the US.

Forage Genetics International

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ANSWER PLOT

Biotechnology & Advanced Technologies

FGI is the alfalfa industries leading developer of biotechnology and marker assisted breeding

- Roundup Ready® Alfalfa
- Reduced Lignin Alfalfa
  - Improves quality, yield or both
- Ongoing trait integration and field testing of other traits specific for alfalfa
  - Abiotic stress, enhanced biomass, delayed flowering
- New corn silage breeding program
- **Alfalfa trait partnerships with Noble Foundation, USDA-ARS and Monsanto**

Forage Genetics International

AgriSOLUTIONS CROPLAN GENETICS

ANSWER PLOT™

Consortium *for* Alfalfa Improvement

USDFRC

THE SAMUEL ROBERTS NOBLE FOUNDATION

Forage Genetics International

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ANSWER PLOT™

Potential Quality Traits

Improved fiber digestibility

- **Reduced lignin alfalfa**

Increased efficiency of protein utilization

- Decrease post harvest proteolysis in haylage
  - PPO alfalfa (poly phenol oxidase)
- Decrease rate/extent of rumen degradation
  - Tannin alfalfa

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CROPLAN GENETICS

Agrisoul

Consortium for Alfalfa Improvement

IMPROVED FIBER DIGESTIBILITY

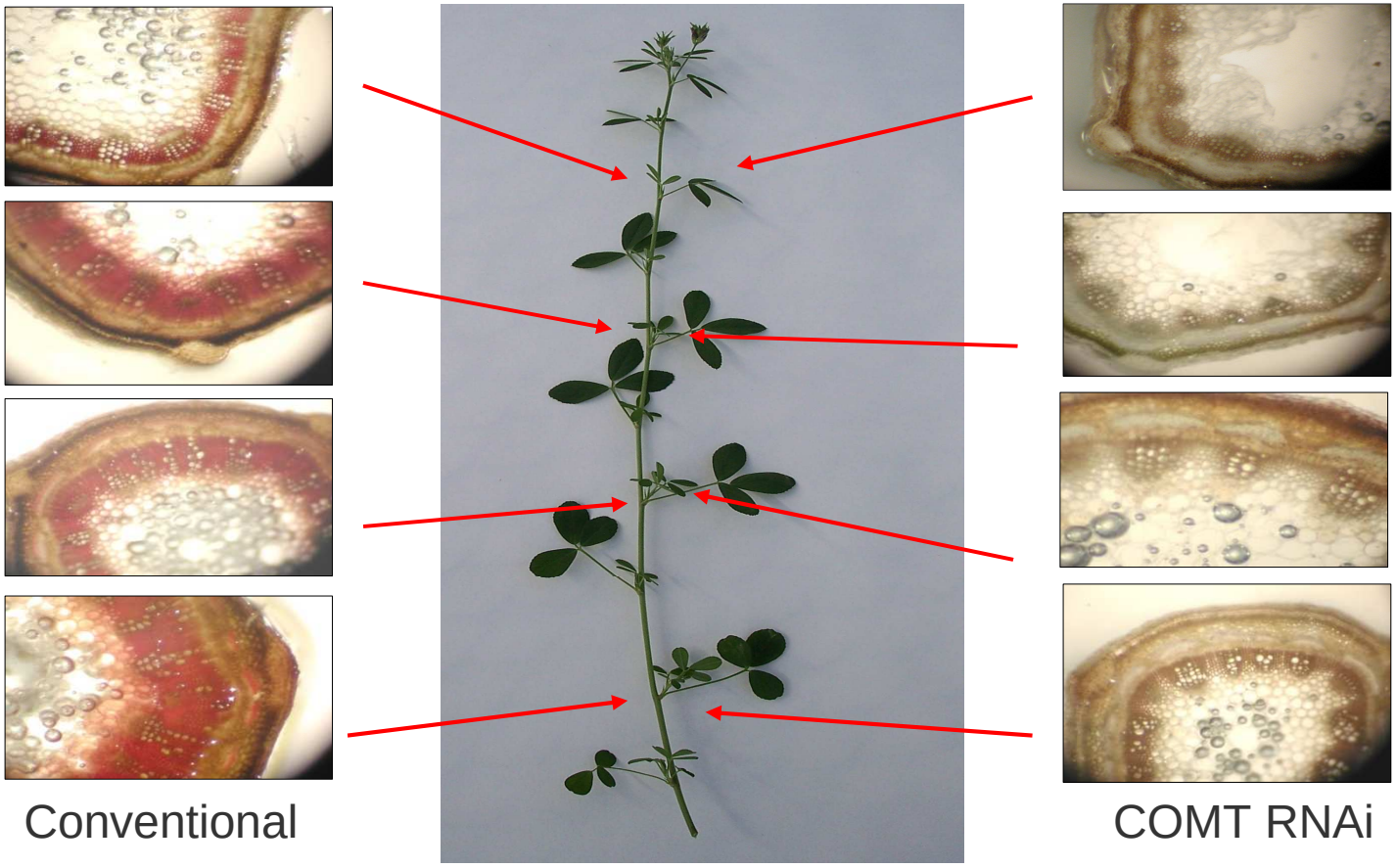
Lignin is an indigestible phenolic compound in alfalfa cell walls.

As alfalfa matures, lignin content increases.

Lignin cross-links with cellulose which decreases digestibility of fiber (NDF).

Genetic engineering can be used to modulate lignin synthesis – altered lignin content and composition.

Maule staining of Conventional vs RL transgenic alfalfa



Conventional

COMT RNAi

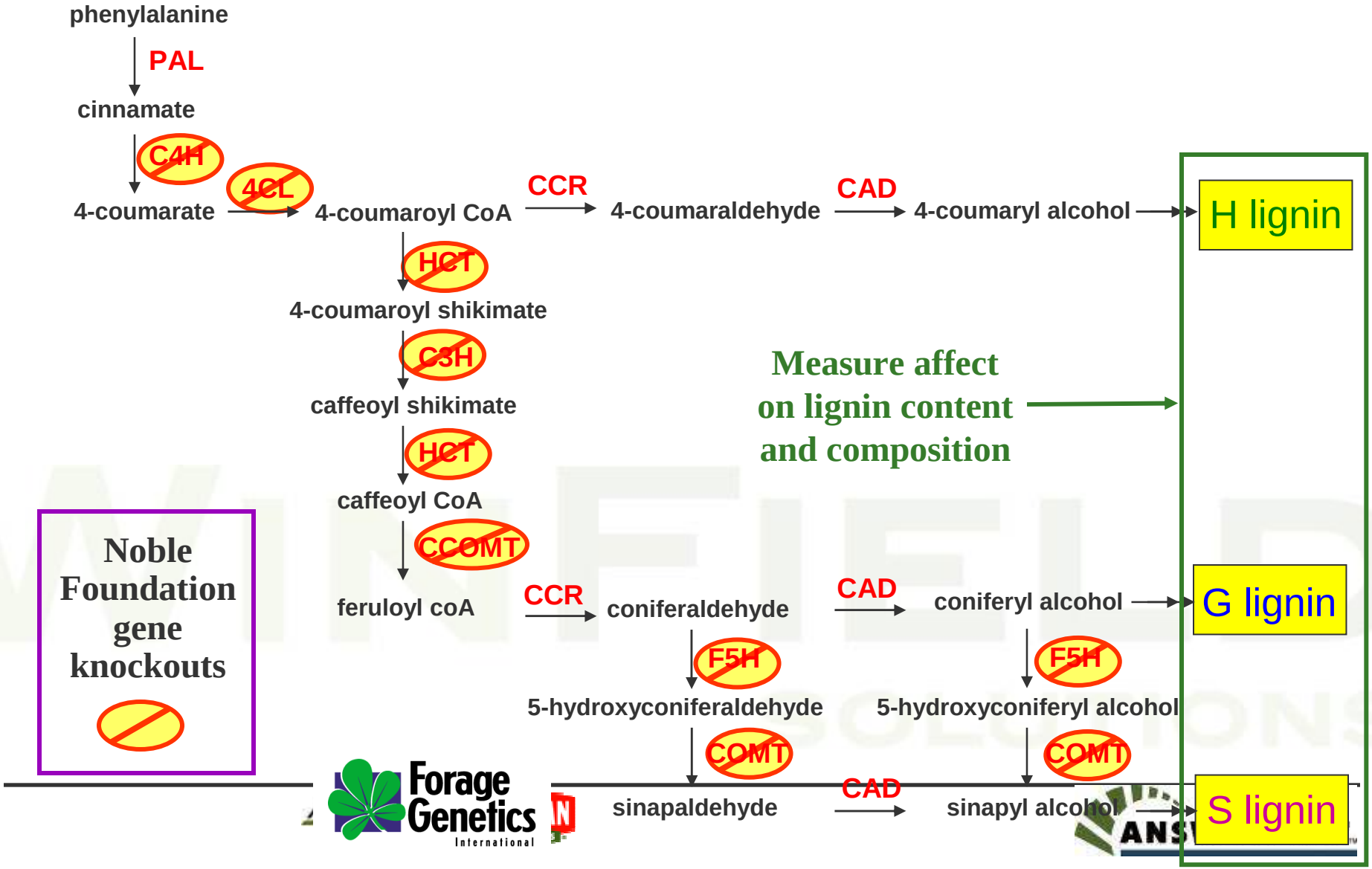
Reduced Lignin Alfalfa

USDFRC

The USDFRC estimates that a 10% increase in fiber digestibility would:

- Increase milk/beef production by $350M/yr
- Decrease manure production by 2.8M T/yr

Lignin Biosynthetic Pathway



Proof of Concept - Nampa, ID May 30, 2007

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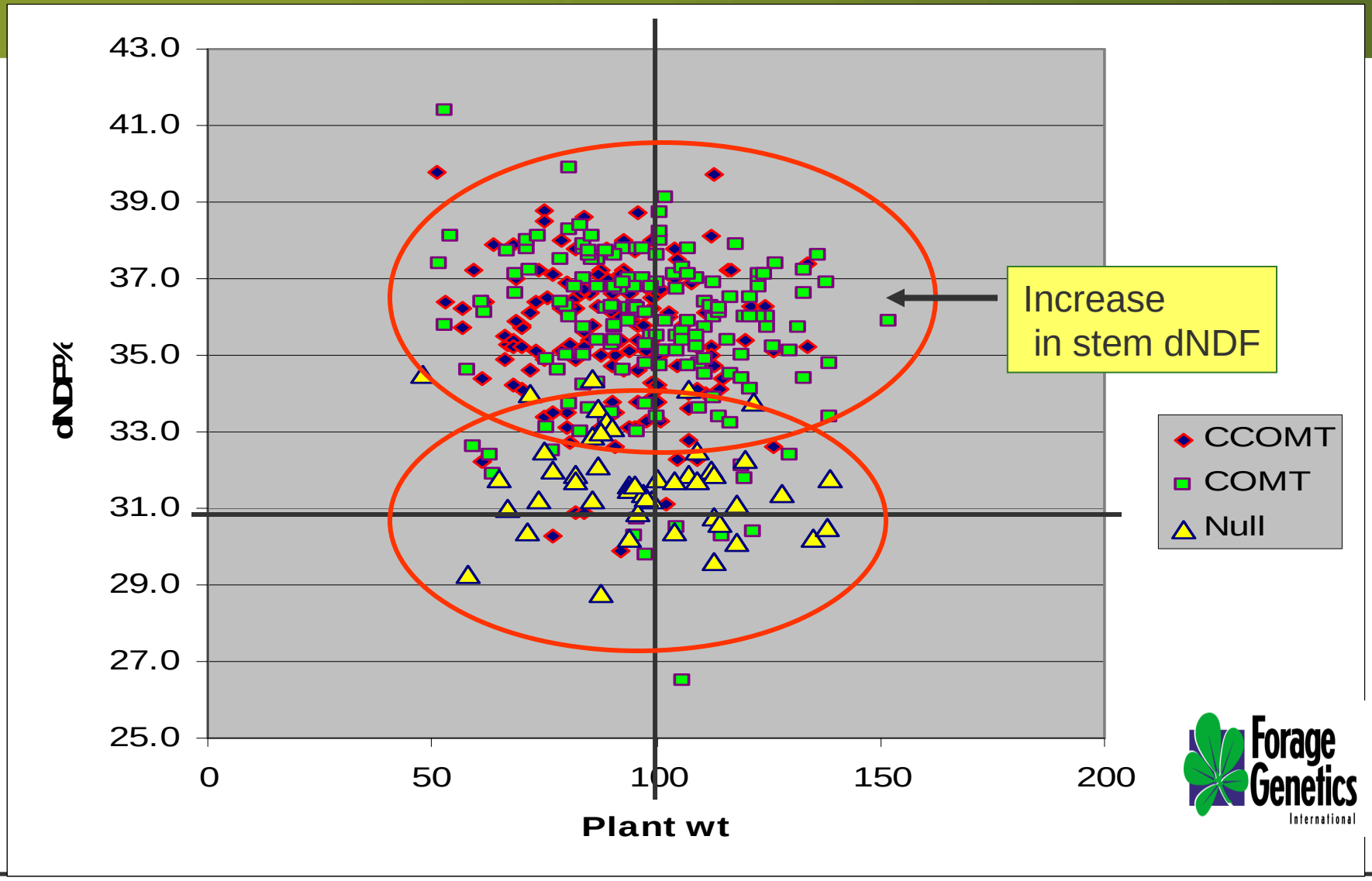
2005 RL field study summary – West Salem, WI



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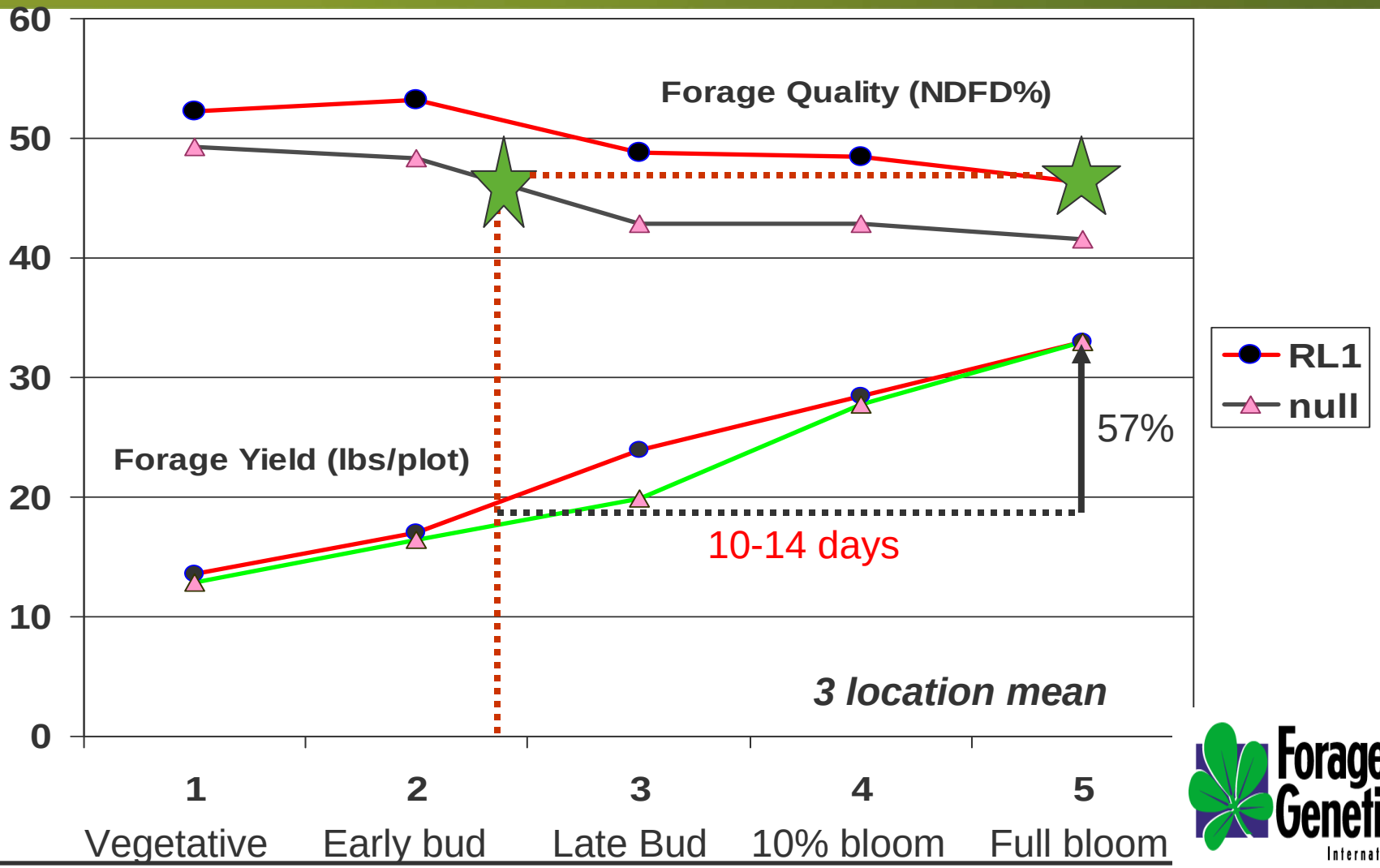
2008 Cutting Management Trials (WI, MN)



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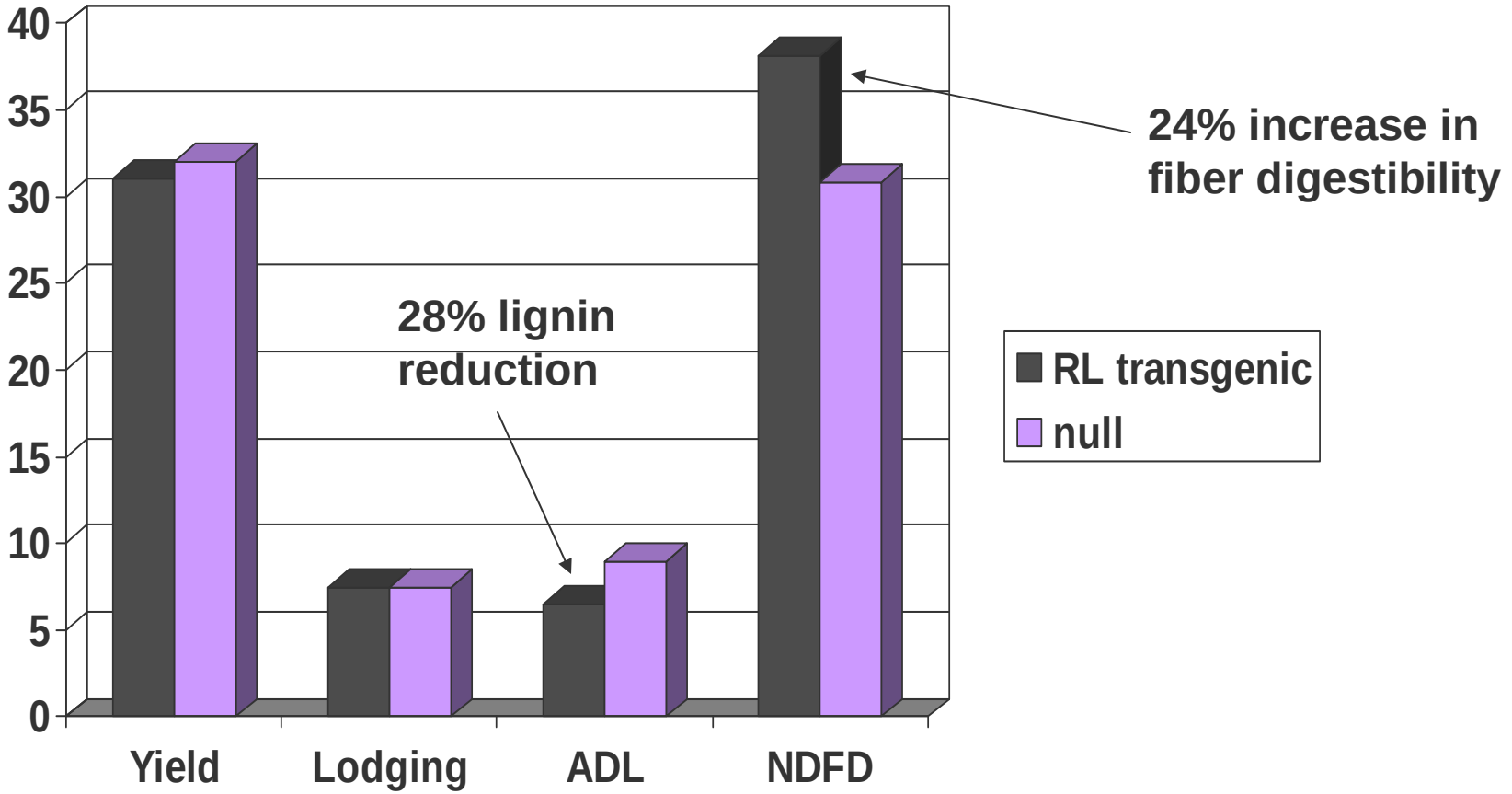
2007 CCOMT Event Sorting
Commercial Construct



Note: **Lower stem samples**, *Consortium equation*, **Average of 25 elite events**

Forage Quality of Hay Samples

6/1/07 Whole Plant Samples – at harvest

Genotype	NDF	ADL	NDFD
CCOMT-	39.8	5.3	53.6
CCOMT null	40.4	6.2	47.4
COMT-	39.4	5.7	57.6
COMT null	40.5	6.1	49.3

Note: USDFRC RL NIRS used for quality analysis

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Forage Genetics International


Land O' Lakes Purina Feed
Large Animal Metabolism Unit (LAMU)

Why Alfalfa ?

- **Feeding qualities**
  - Digestible fiber, protein, minerals
- **Agronomic benefits**
  - Crop rotation, nitrogen credit
  - Reduced soil loss, tolerance to drought
- **High forage yield**
  - Average yield vs. potential yield

INPUT vs. OUTPUT traits

- What is the difference ??
- Why is this important ??

- Input trait = RR alfalfa (apply herbicide to benefit)
- Output trait = Low Lignin, bypass protein, drought

- How might this change future plant improvement?

Genuity® Roundup Ready® Alfalfa Technology Offers

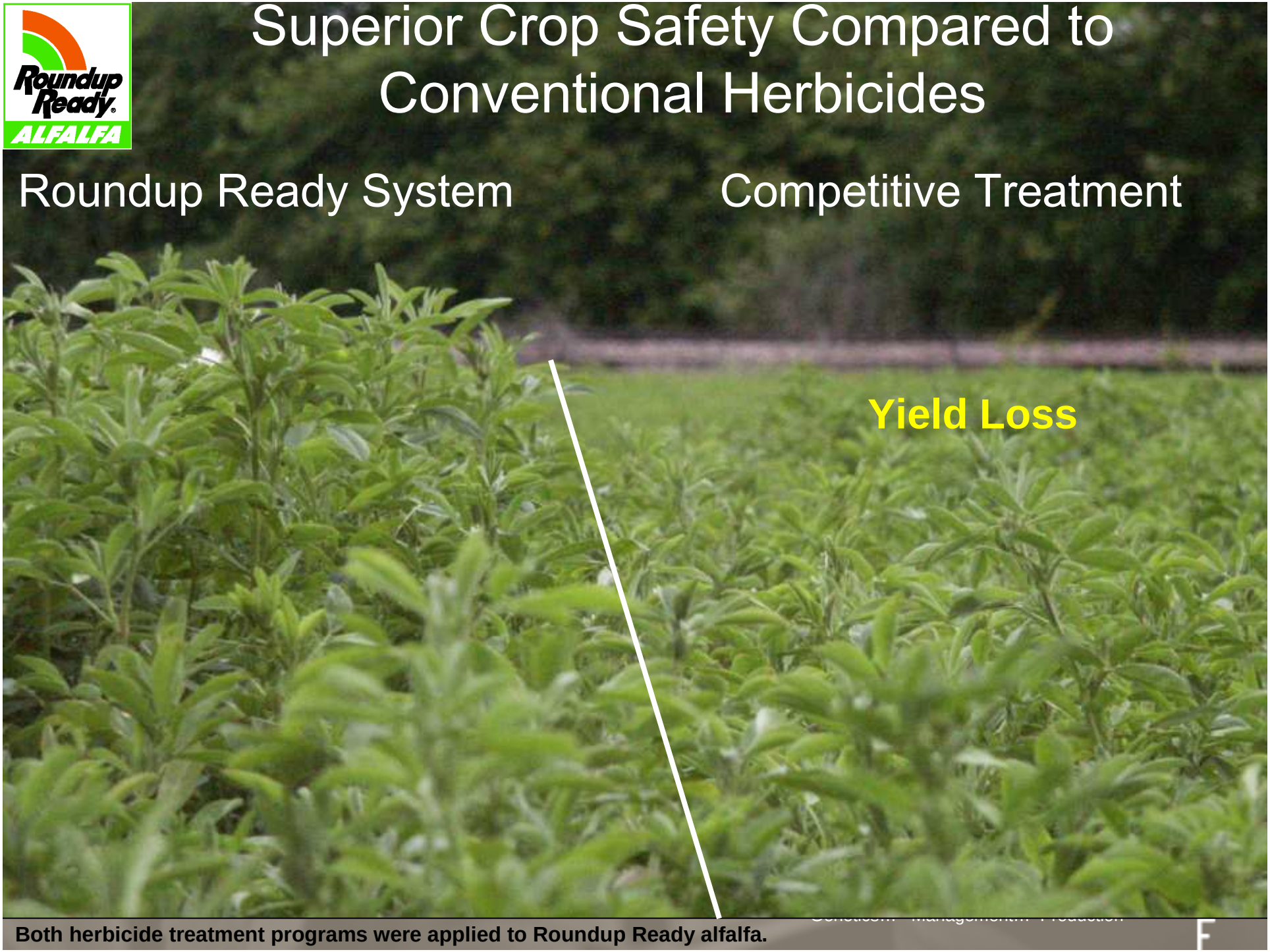
- **Quicker** and More Reliable Stand Establishment.

- **Thicker** Alfalfa Stands From Beginning to End.

- **Better Quality** by Weed Removal will Enhance Digestibility Potential.

WINFIELD SOLUTIONS

Superior Crop Safety Compared to Conventional Herbicides

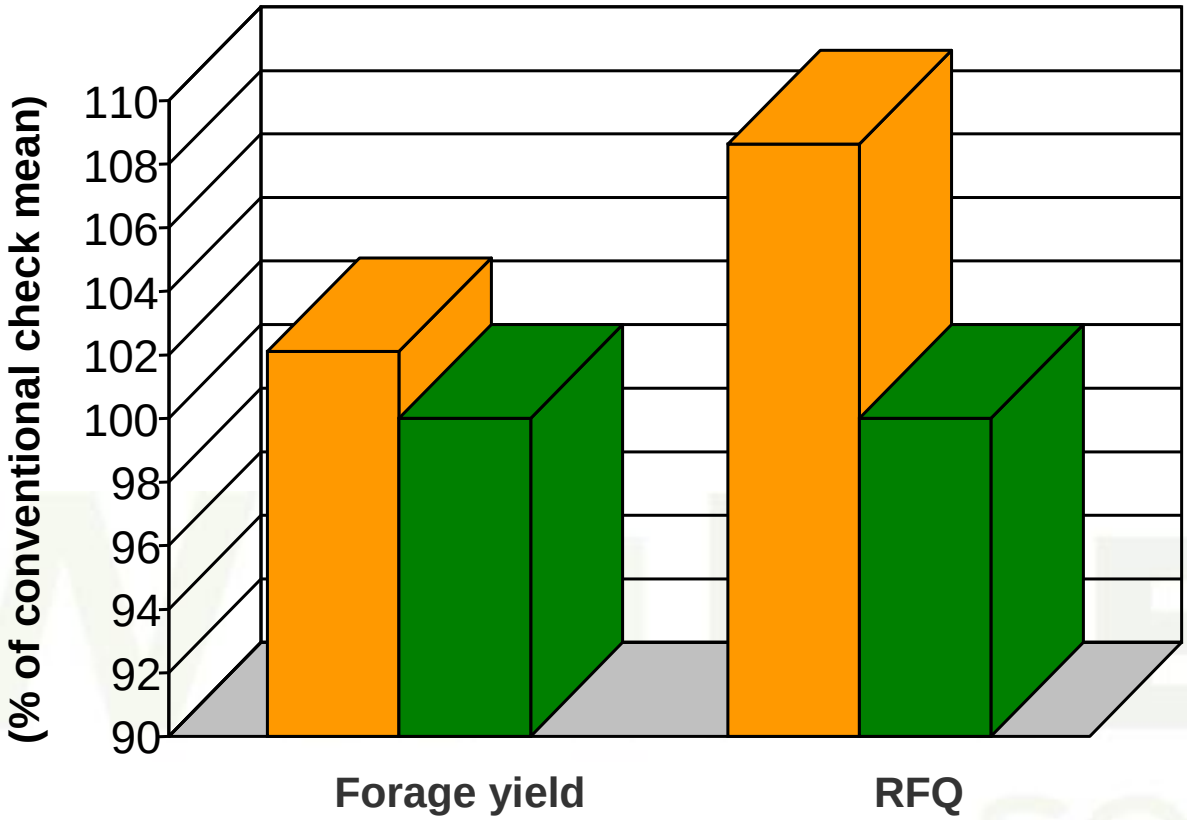


Both herbicide treatment programs were applied to Roundup Ready alfalfa.


Conventional Alfalfa
Fall Planted
Roundup Ready Alfalfa
Fall Planted
No Herbicide
Roundup Original Max
22 Ounces / Acre
Spring Applied

Better Quality by Weed Removal Will Enhance Digestibility Potential

GENRR Alfalfa Varieties Agronomic Performance vs. Conventional Varieties



Genuity®
Roundup Ready®
Conventional

Conventional Checks

- Pioneer 54V54
- Dairyland HybriForce 400
- Ampac Attention
- America's 403T

[1]Trials conducted in 2004 by Forage Genetics, Inc. 15 dormant Roundup Ready ® alfalfa varieties were compared to 4 top-performing commercial conventional varieties in all locations. Yield data means summarized over 7 locations. RFQ data means summarized over 3 locations.

General Establishment Methods.
Genuity® Roundup Ready® Alfalfa Benefits to Producer:

1.) Direct Seed Alfalfa in Spring - direct seeded alfalfa can deliver quicker, thicker, better quality alfalfa stands on your farm

- Spring seed GENRR alfalfa (no oats)
- Apply glyphosate at 30 days after seeding (dependent upon heat units)
- Harvest 1st crop new seeding alfalfa around 60 days
- Harvest 2nd and following crops at about 30-35 days
- Plan to harvest several weed free high quality cuttings each season

30 days after seeding…

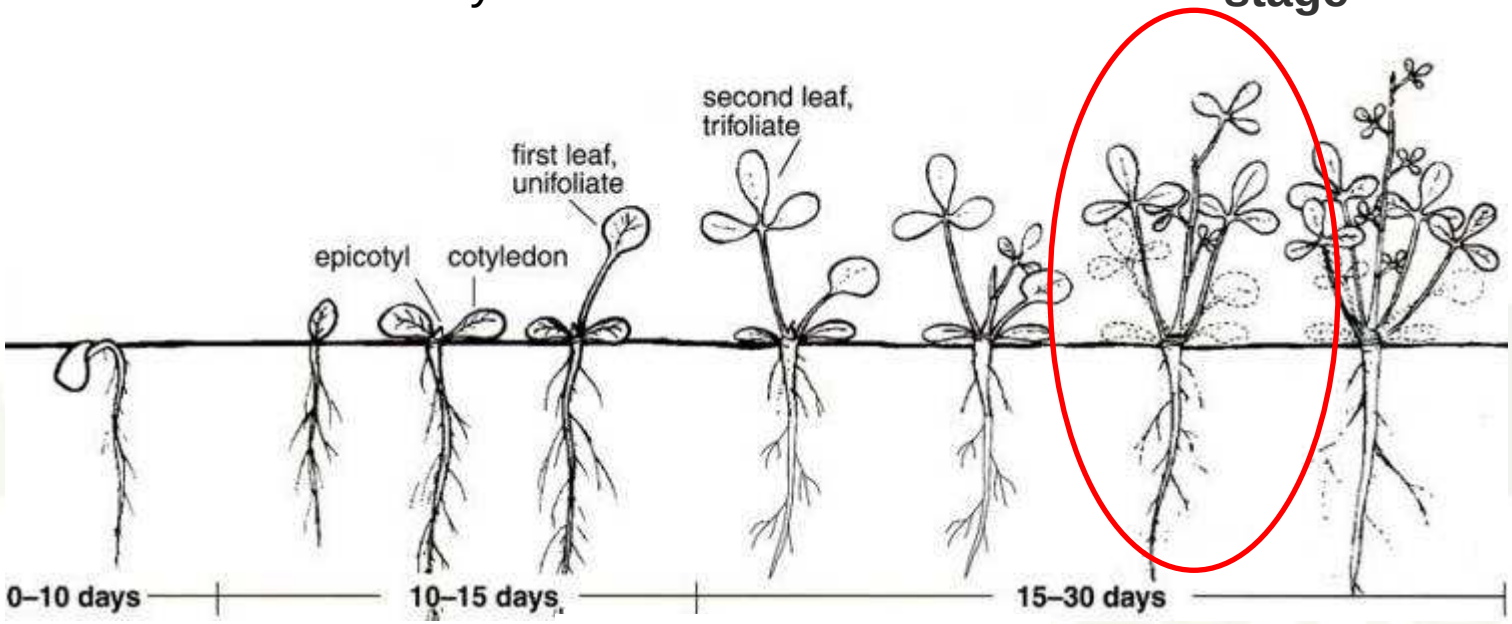
First Glyphosate Application

Eliminate null plants (typically 4-5% of seeds)

Remove competitive weeds/cover crop

- Depending on heat units application may need to be **sooner** than 30 days

3 to 4 trifoliate alfalfa growth stage

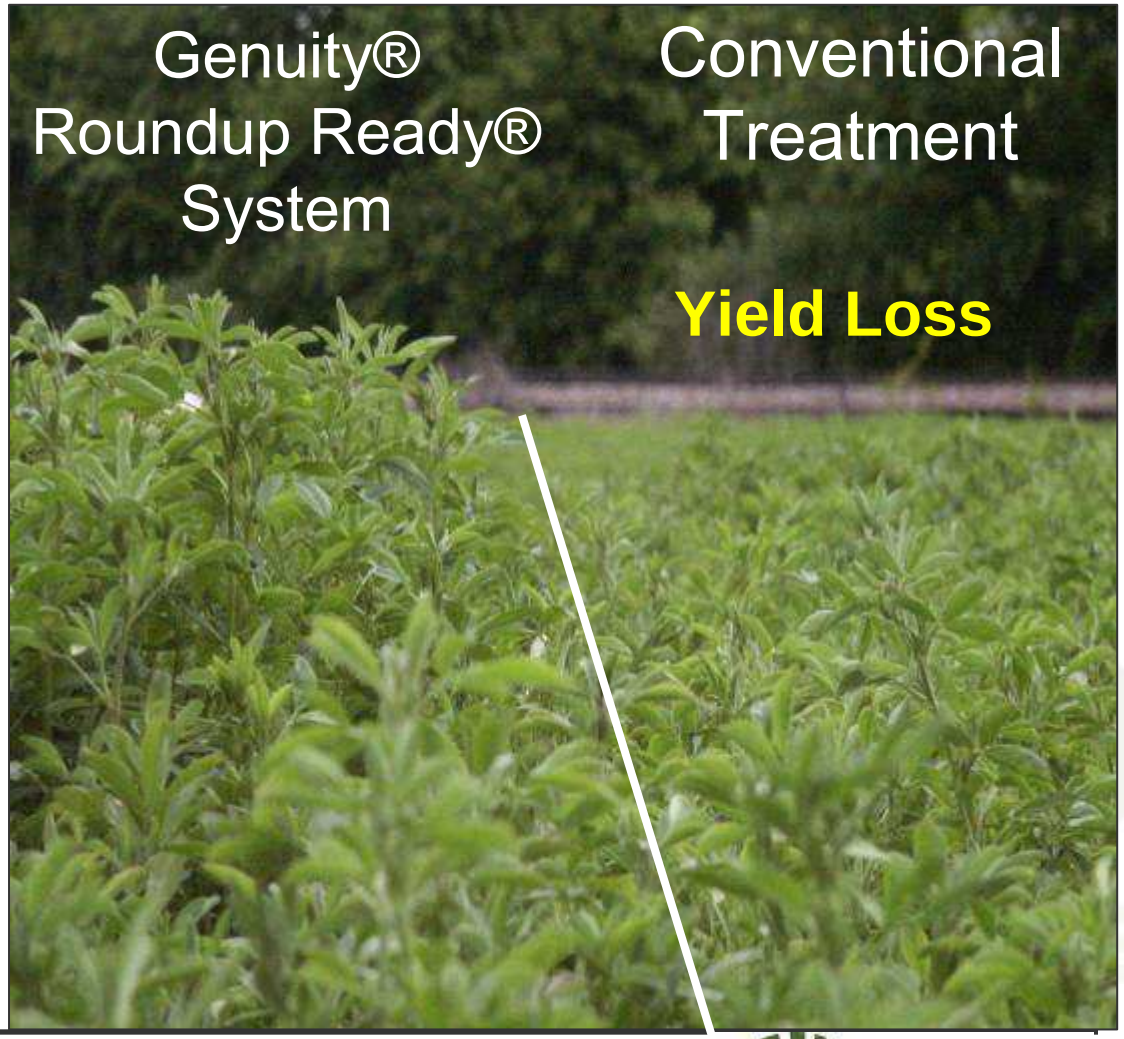


days after seeding

Superior Crop Safety Compared to Conventional Herbicides

Genuity® Roundup Ready® System Allows For…

- Decreased crop injury from conventional herbicides
- Increased Forage Yield Potential
- Decreased competition from weeds and/or cover crop



*Both herbicide treatment programs were applied to Roundup Ready® alfalfa.

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ANSWER PLOT™

Genuity® Roundup Ready® Alfalfa Benefits to Producer

2.) Use Oat Cover Crop "Take-Out" **-** use on your highly erodible soils (HEL)

Seedling oats will provide an immediate soil cover for the alfalfa.

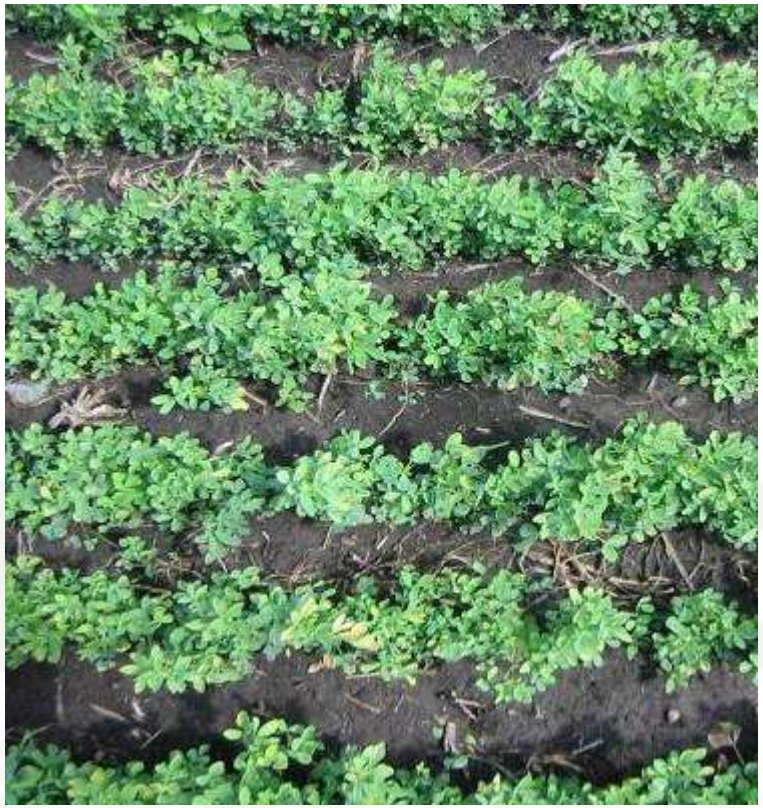
Seed oats and GENRR alfalfa. (Option: Seed oats only in the highly erodible areas of field)

- Apply glyphosate when oats are about 6-12 inches tall. (Dead oats will provide excellent soil erosion control measure)
- Harvest 1st crop alfalfa around 70-80 days after seeding
- Harvest 2nd and following crops around 30-35 days
- Plan to harvest several weed free high quality cuttings each season

Genuity® Roundup Ready® Alfalfa Benefits to Producer

3.) Use for "clean-up" after Oatlage harvest - use on your most erodible soils.

- At approx. 10-15 days after oatlage harvest apply glyphosate to oat stubble
- Excellent time to tank mix Insecticide and Glyphosate
- Harvest weed free feed about 30-40 days after application



*Always read and follow label directions.

Genuity® Roundup Ready® Alfalfa Benefits to Producer

4.) Direct Seed Alfalfa in Late Summer - seed GENRR alfalfa following winter wheat or other late summer harvested crops.

- Seed GENRR alfalfa during month of August in Midwest
- Apply glyphosate approx. 10-15 days after volunteer/weed plants emerge
- Get ready for clean weed free hay in 1st crop next spring

Genuity® Roundup Ready® Alfalfa Benefits to Producer

5.) Weed Control in Established Stands

Preliminary test results:

- Roundup® applications in spring and/or fall result in excellent season-long control of weeds.
- Excellent crop safety with respect to forage yield and quality.

Conventional Alfalfa Fall Planted No Herbicide

Genuity® Roundup Ready® Alfalfa System Fall Planted

Stand Takeout for Recommendations Genuity® Roundup Ready® Alfalfa

Use one of the following herbicides for stand takeout at recommended label rates:

- 2,4-D ester/amine
- dicamba (Banvel®/Clarity®)
- 2,4-D + dicamba
- clopyralid + 2,4-D (Curtail®)
- clopyralid (Stinger®)

Fall application of above herbicides is preferred for stand take out.

Tillage following the herbicide application may improve the control of established alfalfa.

Refer to individual product labels for recommended rates and rotational crop considerations.

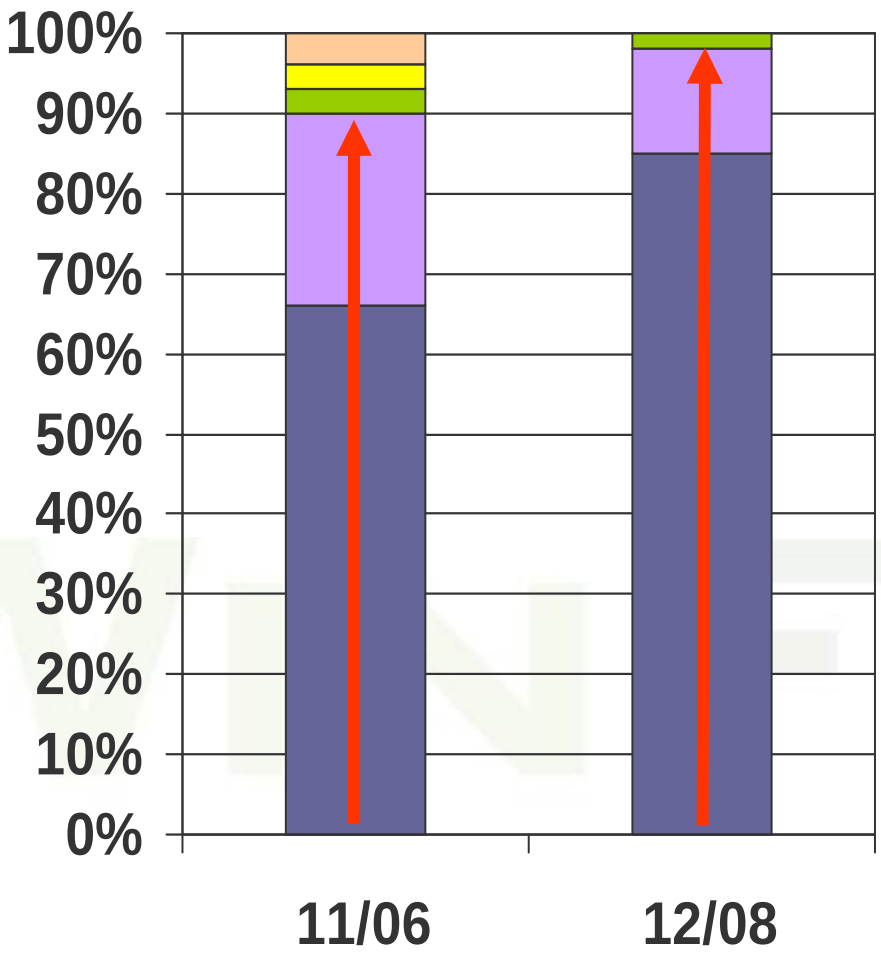
*Always read and follow label directions.

Reasons Why Customers Are Satisfied With Genuity® Roundup Ready® Alfalfa

- Good/better weed control/clean crop
- Good/better yield
- Good growth – comes up better/more vigor
- Quality forage/feed
- Looks good/good appearance
- Early Establishment
- Easy program

*Information was collected from approx. 350 telephone surveys of current growers with 50+ acres of GENRR alfalfa in each year across all regions. Survey's were conducted by Monsanto.

Roundup Ready Alfalfa
Customer Satisfaction



Overall, how satisfied are you with Roundup Ready Alfalfa?

- Don't know
- Very dissatisfied
- Somewhat disstatisfied
- Somewhat satisfied
- Very satisfied

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ANSW Roundup Ready ALFALFA

ROUNDUP® READY ALFALFA VALUE PERCEPTION

2006

- Grower Reported advantage of $49/Acre
- Inclusive of seed, trait, herbicide and other costs compared with a comparable acre of conventional alfalfa

2008

- Grower Reported advantage of .9/tons per acre, conservatively worth $110/acre
- Based on self reported grower comparisons to like, but conventional alfalfa stands

Quicker and More Reliable Stand Establishment

Comparison of various herbicide treatments on stand establishment of GENRR alfalfa with heavy early weed competition. GENRR is a cost effective system that increases the likelihood of successful stand establishment.

Spring Seeded Trial

Five days before first harvest

Seven days after first harvest

February 2, 2011

WINFIELD SOLUTIONS

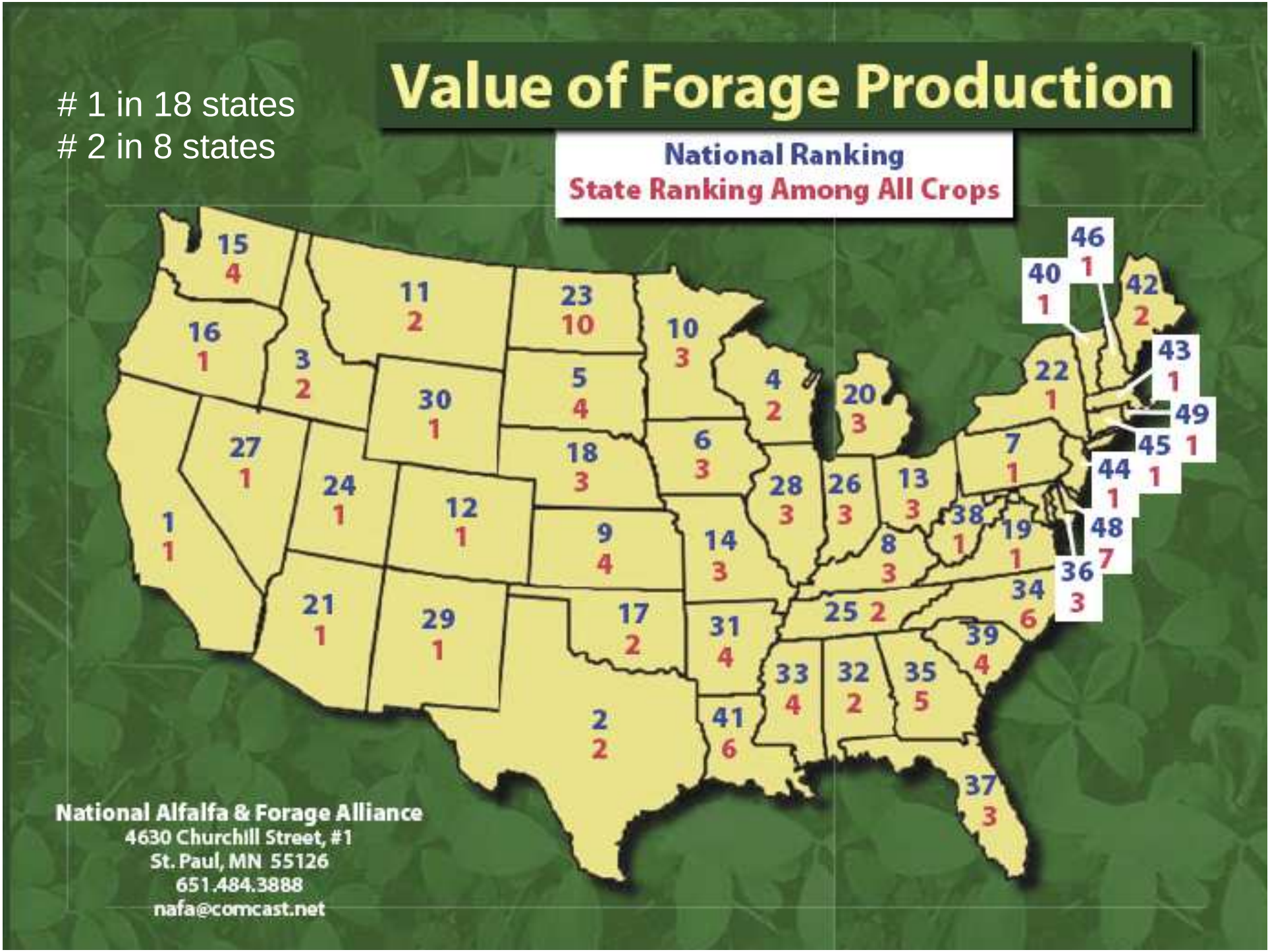
**Broad Spectrum Weed Control

2001 Herbicide Comparison – FGI research station, West Salem, Wisconsin

Be an Alfalfa Expert …. R7 for alfalfa

Stand Establishment
Soil Fertility and NutriSolutions
Stand Evaluations and “Reading the Stand”
Harvest Management and NutriSave
Insects Control and Agrisolutions Products
Alfalfa Diseases
Variety Selection and Seed Coating

1 in 18 states
2 in 8 states



Thank You!

QUESTIONS?

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